

INFORMATION SHEET

ORDER NO.
KNIGHTS LANDING COMMUNITY SERVICES DISTRICT
KNIGHTS LANDING WASTEWATER TREATMENT FACILITY
YOLO COUNTY

Background

Knights Landing Community Services District owns and operates the Knights Landing wastewater treatment facility (WWTF), which is ½ mile south of County Road 116 near Knights Landing, in Yolo County. The Discharger proposes to expand the facility to accommodate planned development in the community. Monthly sewer service rates were \$27 in 2006, and the corresponding residential connection fee was \$11,100 per equivalent dwelling unit.

The existing WWTF consists of a wet well lift station, eight wastewater stabilization ponds on approximately 20 acres and a 31.5-acre spreading basin. The stabilization ponds are operated as two parallel passive stabilization systems with four ponds each. The spreading basin receives overflow from the eight existing ponds during the wet season only. The WWTF does not use aerators or other active treatment systems. The current average daily dry weather flow is estimated to be 80,000 gallons per day (gpd). Rising groundwater levels during extended periods of heavy rainfall may cause significant infiltration of groundwater into the sewer system.

The community water supply is moderately saline and moderately hard, with high concentrations of boron. Influent wastewater quality is most similar to typical domestic wastewater and the use of the municipal water supply does not appear to cause an unreasonable incremental increase in salinity as measured in the WWTF influent. However, evapoconcentration as the wastewater flows from the primary ponds through to the final ponds increases the overall salinity of the wastewater significantly beyond concentrations that would be considered a reasonable increment over the water supply concentrations.

The Discharger plans to expand the existing WWTF to serve a new residential subdivision, which will increase the population served by the WWTF from approximately 1,018 to 1,320. The WWTF treatment and disposal capacity will be increased by converting part of the existing land spreading area to two percolation/evaporation ponds. The remainder will continue to be used as land spreading area when needed. The walls of the headworks structure will be raised by one foot to provide 100-year flood protection.

The Discharger's water balance capacity model indicates that the expanded WWTF will have sufficient capacity for 105,000 gpd as an average daily dry weather flow (from August through October each year) and 48.4 million gallons (MG) as a total annual influent flow (including I/I).

There are currently three groundwater monitoring wells at the facility, and groundwater is typically encountered at depths ranging from 7 to 14 feet below the surrounding ground surface. The gradient direction of the shallow groundwater varies from east to southwest, but does not exhibit a consistent seasonal variation. The Knights Landing Ridge Cut, which parallels the WWTF along its entire length may strongly influence groundwater levels and

flow directions. The groundwater monitoring results for electrical conductivity, total dissolved solids, sodium, iron, chloride, and manganese strongly indicate that the WWTF has degraded groundwater quality. Additionally, coliform organisms were routinely detected in the downgradient monitoring wells.

Basin Plan, Beneficial Uses, and Regulatory Considerations

Surface water drainage is to the Sacramento River near its confluence with the Colusa Basin Drain. The *Water Quality Control Plan for the California Regional Water Quality Control Board Central Valley Region, Fourth Edition* (Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin. Beneficial uses often determine the water quality objectives that apply to a water body. For example, waters designated as municipal and domestic supply must meet the maximum contaminant levels (MCLs) for drinking waters. The Basin Plan sets forth the applicable beneficial uses (industrial, agricultural, and municipal and domestic supply in this instance) of groundwater, procedure for application of water quality objectives, and the process for and factors to consider in allocating waste assimilation capacity.

Antidegradation

The antidegradation directives of State Water Board Resolution No. 68-16, "Statement of Policy With Respect to Maintaining High Quality Waters in California," or "Antidegradation Policy" require that waters of the State that are better in quality than established water quality objectives be maintained "consistent with the maximum benefit to the people of the State." Waters can be of high quality for some constituents or beneficial uses and not others. Policies and procedures for complying with this directive are set forth in the Basin Plan.

Resolution 68-16 is applied on a case-by-case, constituent-by-constituent basis in determining whether a certain degree of degradation can be justified. It is incumbent upon the Discharger to provide technical information for the Regional Board to evaluate that fully characterizes:

- All waste constituents to be discharged;
- The background quality of the uppermost layer of the uppermost aquifer;
- The background quality of other waters that may be affected;
- The underlying hydrogeologic conditions;
- Waste treatment and control measures;
- How treatment and control measures are justified as best practicable treatment and control;
- The extent to which the discharge will impact the quality of each aquifer; and
- The expected degree of degradation below water quality objectives.

In allowing a discharge, the Regional Board must comply with CWC Section 13263 in setting appropriate conditions. The Regional Board is required, relative to the groundwater that may be affected by the discharge, to implement the Basin Plan and consider the beneficial uses to be protected along with the water quality objectives essential for that purpose. The Regional Board need not authorize the full utilization of the waste assimilation capacity of the

groundwater (CWC 13263(b)) and must consider other waste discharges and factors that affect that capacity.

Certain domestic wastewater constituents are not fully amenable to waste treatment and control and it is reasonable to expect some impact on groundwater. Some degradation for certain constituents is consistent with maximum benefit to the people of California because the technology, energy, water recycling, and waste management advantages of municipal utility service to the State far outweigh the environmental impact of a community that would otherwise be reliant on numerous concentrated individual wastewater systems. Economic prosperity of local communities is of maximum benefit to the people of California, and therefore sufficient reason to accommodate wastewater discharge provided terms of reasonable degradation are defined and met. The proposed Order authorizes some degradation consistent with the maximum benefit to the People of the State but does not authorize pollution (i.e., violation of any water quality objective).

Groundwater monitoring has been conducted around the facility, however additional background groundwater quality data are needed; therefore staff is unable to establish final groundwater limits. Certain aspects of wastewater treatment and control practices may not be justified as representative of Best Practicable Treatment and Control (BPTC). Reasonable time is necessary to gather specific information about the WWTP to make informed, appropriate, long-term decisions. This proposed Order, therefore, establishes interim performance standards for salinity in the form of effluent limitations as well as interim receiving water limitations to assure protection of beneficial uses of groundwater of the State pending the completion of certain tasks and provides time schedules to complete specified tasks. During this period, degradation may occur from certain constituents, but can never exceed water quality objectives (or natural background water quality should it exceed objectives) or cause nuisance.

Water quality objectives define the least stringent limits that could apply as water quality limitations for groundwater at this location, except where natural background quality unaffected by the discharge of waste already exceeds the objective. The values below reflect water quality objectives that must be met to maintain specific beneficial uses of groundwater. Unless natural background for a constituent proves higher, the groundwater quality limit established in proposed Order is the most stringent of the values for the listed constituents.

<u>Constituent</u>	<u>Units</u>	<u>Limit</u>	<u>Beneficial Use</u>	<u>Water Quality Objective</u>	<u>Criteria or Justification</u>
Ammonia	mg/L	1.5	MUN ¹	Tastes and Odors	Odor Threshold ²
Boron	mg/L	0.7	AGR ³	Chemical Constituents	Protect sensitive crops ⁴
	mg/L	1.0	MUN ¹	Toxicity	Calif. Drinking Water Notification Level based on toxicity ¹¹
Chloride	mg/L	106	AGR ³	Chemical Constituents	Protect sensitive crops irrigated via sprinklers ⁴
		142	AGR ³	Chemical Constituents	Protect sensitive crops ⁴

WASTE DISCHARGE REQUIREMENTS ORDER NO.
KNIGHTS LANDING COMMUNITY SERVICES DISTRICT
KNIGHTS LANDING WASTEWATER TREATMENT FACILITY
YOLO COUNTY

4

<u>Constituent</u>	<u>Units</u>	<u>Limit</u>	<u>Beneficial Use</u>	<u>Water Quality Objective</u>	<u>Criteria or Justification</u>
		250	MUN ¹	Chemical Constituents	Recommended Secondary MCL ⁵
		500	MUN ¹	Chemical Constituents	Upper Secondary MCL ⁵
Iron	mg/L	0.3	MUN ¹	Chemical Constituents	Secondary MCL ⁶
Manganese	mg/L	0.05	MUN ¹	Chemical Constituents	Secondary MCL ⁶
Nitrate plus Nitrite as N	mg/L	10	MUN ¹	Chemical Constituents	Primary MCL ⁷
Nitrite as N	mg/L	1	MUN ¹	Chemical Constituents	Primary MCL ⁷
Sodium	mg/L	69	AGR ³	Chemical Constituents	Protect sensitive crops ⁴
Total Dissolved Solids	mg/L	450 ⁸	AGR ³	Chemical Constituents	Protect sensitive crops ⁴
		500	MUN ¹	Chemical Constituents	Recommended Secondary MCL ⁵
		1,000	MUN ¹	Chemical Constituents	Upper Secondary MCL ⁵
Total Coliform Organisms	MPN/100 ml	<2.2	MUN ¹	Bacteria	Basin Plan numerical objective and non-detect MCL ⁸
Trihalomethanes	ug/L	80	MUN ¹	Chemical Constituents	
Bromoform	ug/L	4	MUN ¹	Toxicity	USEPA IRIS Cancer Risk Level ⁹
Bromodichloromethane	ug/L	0.27	MUN ¹	Toxicity	Cal/EPA Cancer Potency Factor ¹²
Chloroform	ug/L	1.1	MUN ¹	Toxicity	Cal/EPA Cancer Potency Factor ¹²
Dibromochloromethane	ug/L	0.37	MUN ¹	Toxicity	Cal/EPA Cancer Potency Factor ¹²
pH	pH Units	6.5 to 8.5	MUN ¹	Chemical Constituents	Secondary MCL ¹⁰
		6.5 to 8.4	AGR ³	Chemical Constituents	Protect sensitive crops ⁴

¹ Municipal and domestic supply

² J.E. Amoores and E. Hautala, Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volatilities for 214 Industrial Chemicals in Air and Water Dilution, Journal of Applied Toxicology, Vol. 3, No. 6 (1983).

³ Agricultural supply

⁴ Ayers, R. S. and D. W. Westcott, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985)

⁵ Title 22, California Code of Regulations (CCR), Section 64449, Table 64449-B which is incorporated by reference into the Basin Plan.

⁶ Title 22, CCR, Section 64449, Table 64449-A which is incorporated by reference into the Basin Plan.

⁷ Title 22, CCR, Section 64431, Table 64431-A which is incorporated by reference into the Basin Plan.

⁸ Title 22, CCR, Section 64439, which applies the narrative objective to fully protect the cited beneficial use.

⁹ USEPA Integrated Risk Information System, <http://www.epa.gov/iris>.

¹⁰ Title 40, Code of Federal Regulations, Section 143.3, which applies the narrative objective to fully protect the cited beneficial use.

- ¹¹ California Department of Public Health, Division of Drinking Water and Environmental Management, Drinking Water Notification Levels, <http://www.cdph.ca.gov/programs/Pages/DWP.aspx>.
- ¹² CAL/EPA Toxicity Criteria Database (OEHHA), <http://www.oehha.org/risk/ChemicalDB>.

Domestic wastewater contains numerous dissolved organic and inorganic constituents that together comprise Total Dissolved Solids (TDS). Each component constituent is not individually critical to any beneficial use. Critical constituents are individually listed. The cumulative impact from the other constituents, along with the cumulative affect of the constituents that are individually listed can be effectively controlled using TDS as a generic indicator parameter.

Not all TDS constituents pass through the treatment process and soil profile in the same manner or rate. Chloride tends to pass through both rapidly to groundwater. However, groundwater chloride concentrations in the region are highly variable, which might limit the use of chloride as an indicator parameter of groundwater degradation. Boron is another TDS constituent that may occur in wastewater in concentrations greater than in groundwater because it is a common ingredient of detergents. Other indicator constituents for monitoring for groundwater degradation due to land application of wastewater include total coliform bacteria, ammonia, total nitrogen, and Total Trihalomethanes (TTHMs) a by-product of chlorination. Dissolved iron and manganese are useful indicators to determine whether components of the WWTP with high-strength wastewater constituents, such as sludge handling facilities, are ineffective in containing waste. Exceptionally high TDS and nitrogen also typifies this type of release.

Treatment Technology and Control

Given the character of domestic wastewater, secondary treatment technology is generally sufficient to control degradation of groundwater from decomposable organic constituents. Adding disinfection significantly reduces populations of pathogenic organisms, and reasonable soil infiltration rates and unsaturated soils can reduce them further. Neither organics nor total coliform organisms, the indicator parameter for pathogenic organisms, should be found in groundwater beneath a facility that is well-sited, well-designed, and well-operated. The WWTF provides only passive oxidation systems and no disinfection.

Domestic wastewater typically contains nitrogen in concentrations greater than water quality objectives, which vary according to the form of nitrogen. Groundwater degradation by nitrogen can be controlled by an appropriate secondary treatment system (e.g., oxidation ditch), tertiary treatment with nitrogen reduction, and agronomic reuse crops that are harvested and removed from the land application area. The effectiveness varies, but generally best practicable treatment and control is able to control nitrogen degradation of groundwater at a concentration well below the water quality objectives. The proposed interim limitation reflects water quality objectives.

Dissolved solids can pass through the treatment process and soil profile; effective control of such constituents relies primarily upon source control and pretreatment measures. In the best of circumstances, long-term land discharge of treated wastewater will degrade groundwater with dissolved solids (as measured by TDS and EC). The proposed Order sets

interim groundwater limitations equivalent to water quality objectives, while site-specific, constituent-specific limits are developed in conjunction with a BPTC evaluation of source control and pretreatment.

Other constituents in domestic wastewater that may pass through the treatment process and the soil profile, include recalcitrant organic compounds, radionuclides, and pharmaceuticals. Hazardous compounds are not usually associated with domestic wastewater and when present are reduced in the discharge to inconsequential concentrations through dilution and treatment. It is inappropriate to allow degradation of groundwater with such constituents, so proposed limits are nondetectable concentrations.

A discharge of treated wastewater water that overloads soils with nutrients and organics can result in anaerobic conditions in the soil profile, which in turn creates organic acids and decreases soil pH. Under conditions of low soil pH (below 5), iron and manganese compounds in the soil can solubilize and leach into groundwater. Overloading the land application areas is preventable. Though iron and manganese limits are set at their respective water quality objectives, groundwater pH is expected to remain the same as background.

Title 27

Title 27, CCR, Section 20005 et seq. ("Title 27"), contains regulations to address certain discharges to land. Title 27 establishes a waste classification system, specifies siting and construction standards for containment of classified waste, requires extensive monitoring of groundwater and the unsaturated zone for any indication of failure of containment, and specifies closure and post-closure maintenance requirements. Generally, no degradation of groundwater quality by any waste constituent is acceptable under Title 27 regulations.

Discharges of domestic sewage and treated wastewater can be treated and controlled to a degree that will not result in unreasonable degradation of groundwater. For this reason, they have been conditionally exempted from Title 27. Discharges of domestic sewage and treated effluent which are regulated by WDRs and treatment and storage facilities associated with the WWTP are considered exempt from Title 27 under Section 20090(a), provided that the discharges and facilities will not result in a violation of any water quality objective. As the exemption specifically excludes the discharge to land of: 1) solid waste such as grit and screenings that result from treatment of domestic sewage, and 2) residual sludge that will not be further treated at the WWTP, such discharges must comply with provisions of Title 27.

The discharge of treated wastewater and the operation of treatment and/or storage facilities associated with a wastewater treatment plant can be allowed without requiring compliance with Title 27 only if groundwater degradation complies with the Basin Plan, Resolution No. 68-16 (Antidegradation Policy), and does not violate any water quality objectives.

Discharge Prohibitions and Specifications

The proposed Order allows the monthly average inflow rate to the WWTF to increase to 105,000 gpd as an average daily dry weather flow upon the Executive Officer's approval of a

report certifying that the facility expansion has been completed as proposed and is fully operational.

The proposed Order's effluent limitation for electrical conductivity is an interim performance limit selected to prevent any increases in the current salinity of the WWTF influent and effluent. It was selected based on the highest recent results for electrical conductivity in the WWTF pond system

The discharge specifications regarding dissolved oxygen and freeboard are consistent with Regional Board policy for the prevention of nuisance conditions and overtopping, and are applied to all such facilities.

The Order requires the Discharger to submit the following technical reports:

- a. Certification that improvements to the WWTF headworks structure to prevent flood inundation have been completed;
- b. A Monitoring well Installation Workplan;
- c. A Monitoring Well Installation Report;
- d. A Background Groundwater Quality and Degradation Evaluation Report;
- e. A Salinity Evaluation and Minimization Plan;
- f. A BPTC Evaluation Workplan (if groundwater quality has been degraded);
- g. An Operation and Maintenance Plan; and
- h. An Interim Sewer System management Plan;

Monitoring Requirements

Section 13267 of the CWC authorizes the Regional Board to require monitoring and technical reports as necessary to investigate the impact of a waste discharge on waters of the state. In recent years there has been increased emphasis on obtaining all necessary information, assuring the information is timely as well as representative and accurate, and thereby improving accountability of any discharger for meeting the conditions of discharge. Section 13268 of the CWC authorizes assessment civil administrative liability where appropriate.

The proposed Order includes influent and effluent monitoring, pond monitoring, groundwater monitoring, sludge monitoring, and water supply monitoring.

The Title 27 zero leakage protection strategy relies heavily on extensive groundwater monitoring to increase a discharger's awareness of, and accountability for, compliance with the prescriptive and performance standards. Title 27 regulations pertaining to groundwater monitoring and the detection and characterization of waste constituents in groundwater have been in effect and successfully implemented for many years. No regulation currently specifies similar criteria more suitable for a situation where extensive land application of treated wastewater occurs. It is appropriate that the Title 27 groundwater monitoring procedures be extended and applied on a case-by-case basis under Water Code Section 13267.

The Discharger must monitor groundwater for wastewater constituents expected to be present in the discharge, and capable of reaching groundwater, and violating groundwater limitations if its treatment, control, and environmental attenuation, proves inadequate. The Discharger is required to install additional groundwater monitoring wells around the facility. For each constituent listed in the Groundwater Limitations section, the Discharger must, as part of each monitoring event, compare concentrations of constituents found in each monitoring well to the background concentration or to prescribed numerical limitations to determine compliance.

Reopener

The conditions of discharge in the proposed Order were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. However, information is presently insufficient to develop final groundwater limitations, so the proposed Order contains interim limitations. Additional information must be developed and documented by the Discharger as required by schedules set forth in the proposed Order. As this additional information is obtained, decisions will be made concerning the best means of assuring the highest water quality at reasonable cost. It may be appropriate to reopen the Order if applicable laws and regulations change, but the mere possibility that such laws and regulations may change is not sufficient basis for reopening the Order. The CWC requires that waste discharge requirements implement all applicable requirements.

ALO: 10/10/07